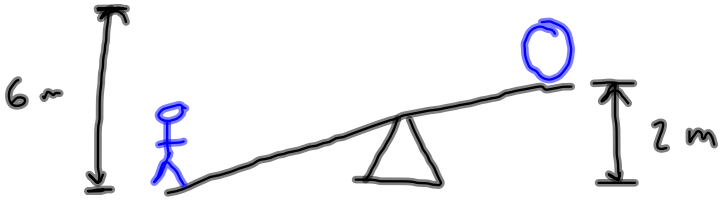
A lever is used to raise a 200 kg stone. To do this a person applies a force of 980 N over a distance of 6.0 m, and the stone raises 2.0 m.
a) What is the IMA of the lever?
b) What is the AMA of the lever?



a) $IMA = \frac{d_e}{d_r} = \frac{6\,m}{2\,m} = 3$

* no units for IMA or AMA

b) $AMA = \frac{F_r}{F_e} = \frac{mg}{F_e} = \frac{1960\,N}{980\,N} = 2$

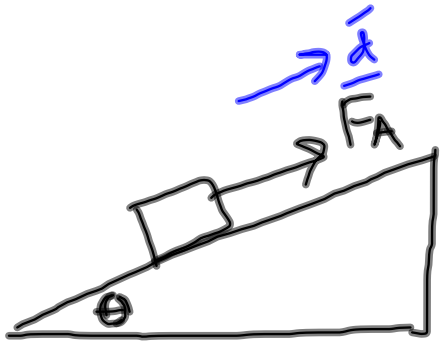
Efficiency:

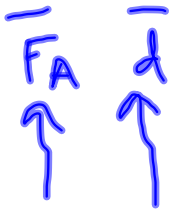
- Measure of how well a machine performs
- $Eff = \left(\frac{AMA}{IMA}\right)(100\%)$

$$= \left(\frac{\text{work by machine on obj.}}{\text{work by you on machine}}\right)(100\%)$$

Inclined Plane Activity:

$W = F\ d \cos\theta$ = 1





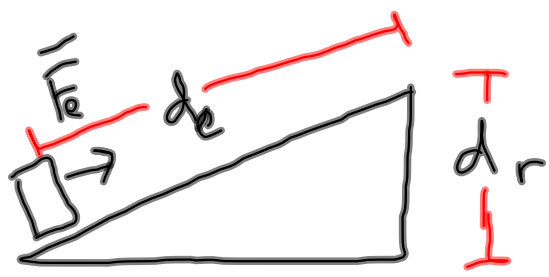
5) Work increased due to friction

4) Displacement increased

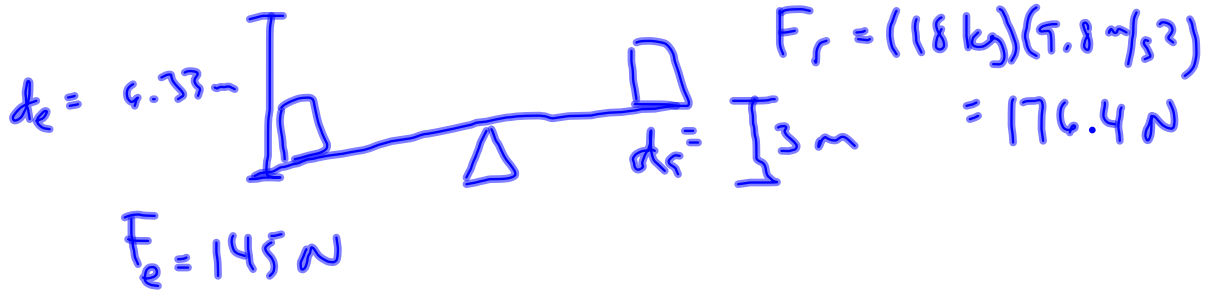
3) Force decreased

$IMA = \left(\frac{d_e}{d_r}\right)(100\%)$

$AMA = \left(\frac{F_r}{F_e}\right)(100\%)$



A dog puts 145.0 N of force (downward) over a distance of 6.33 m on a giant see-saw to lift an 18.00 kg bear cub on the other side a distance of 3.00 m.
a) What is the IMA of the lever?
b) What is the AMA of the lever?
c) What is the efficiency of the machine?



a) $IMA = \frac{d_e}{d_r} = 2.11$

b) $AMA = \frac{F_r}{F_e} = 1.23$

c) $Eff = \left(\frac{AMA}{IMA}\right)(100\%) = 58\%$

A machine that has an IMA less than one
a) for all practical purposes concerning force and/or distance is useless.
b) is made to help someone/something go a greater distance than they put into the machine.
c) is made to help someone/something obtain more force than they put into the machine.
d) must be having a problem with excessive friction.

$IMA = \frac{d_e}{d_r}$ if $IMA < 1$, $d_e < d_r$

When you push a crate up an inclined plane, the vertical height of the inclined plane will be the
a) effort distance.
b) effort force.
c) fulcrum.
d) resistance distance.
e) resistance force.